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# The Development of a Feasible Community-Specific Cardiovascular Disease Prevention Program: Triangulation of Methods and Sources

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Triangulation of methods, sources, and investigators can lead to a multidimensional understanding of a particular issue. In this study, the combination of qualitative and quantitative data collection methods, and information from community and coalition members resulted in the development of a tailored community-specific intervention. Three components were triangulated after analyzing each separately. A household survey of community members between the ages of 25 and 64 years was conducted to identify knowledge, attitudes, and behaviors related to cardiovascular disease and to assess risk factor levels. Focus group discussions were conducted with community members to describe facilitators and barriers to healthy lifestyles, as well as possible interventions. Natural group discussions with coalition members analyzed the relevance, feasibility, affordability, acceptability, and sustainability of specific intervention activities. Results from the different components were compared and contrasted. Areas of added information, validation, and contradiction were analyzed and guided the development of intervention activities.

**Keywords:** *triangulation; community; cardiovascular*

The development and implementation of effective interventions for health promotion and disease prevention is contingent on a thorough understanding of factors contributing to risk factor and disease occurrence. *Triangulation* has been suggested as a way to increase our understanding of factors influencing health status by combining “research

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strategies to achieve a multi-dimensional view of a phenomena of interest."<sup>1,2</sup> Triangulation can include the use of multiple data sources, multiple methods, multiple investigators, or the three at the same time.<sup>3</sup> Triangulation of methods refers to the use of more than one research method (e.g., structured instruments, observations, and interviews) or data collection techniques, which are selected because each taps a different aspect or dimension of the problem being studied.<sup>4</sup> Multiple source triangulation refers to the gathering of data on a particular topic but from different sources, for example, housewives, health professionals, and/or the elders. Multiple investigator triangulation, on the other hand, refers to the involvement of different actors from different backgrounds, perspectives, and views in the analysis of the issue being explored.

This article reports on the triangulation of methods and sources for the development of community-specific cardiovascular disease (CVD) prevention interventions in the Dar Al Fatwa (DAF) area of Beirut, Lebanon. "Together for Heart Health," hereafter referred to as the "initiative," is an initiative for community-based cardiovascular disease risk factor prevention and control. The phenomenon of interest was the identification of CVD intervention activities that are relevant and acceptable to this particular community. Information from two data sources—community members and coalition members—were gathered to understand the phenomenon. In addition, both qualitative and quantitative methods were used. Because both research methods have different weaknesses and strengths, combining them to understand a certain issue is enriching because the weakness of one method is often compensated by the strength of another.<sup>5-8</sup> Four methods of combining qualitative and quantitative data have been described in the literature.<sup>9</sup> These are the use of qualitative data collection methods to develop quantitative instruments, the use of qualitative methods to explain quantitative findings, the use of quantitative methods to further examine mostly qualitative findings, and the use of both qualitative and quantitative data collection methods equally. The latter method may be especially appropriate in community-based research and intervention programs, as it allows for a better understanding of the unique aspects and characteristics of different communities.<sup>10</sup>

In this initiative, three components were triangulated, including (1) a household survey of community members (quantitative), (2) focus group discussions with community members (qualitative), and (3) natural group discussions with coalition members (qualitative).

Data for the three components were collected independently and analyzed separately prior to triangulation. This article describes the comparison and contrast of results of each of the components and the contribution of each to the selection of the intervention activities.

## BACKGROUND

Lebanon is a low- to middle-income country with a total population of around 3.1 million.<sup>11</sup> Chaos during the civil war and foreign invasions from 1975 until 1991 resulted in a breakdown of the infrastructure, thus affecting the ability of governmental institutions, such as the Ministry of Health, to carry out their usual functions. This contributed to gaps in epidemiological knowledge regarding most diseases. In a country where national statistics and census are nonexistent, researchers fill the gap by conducting sample-specific targeted research.

Some of this research has indicated that despite the war and its consequences, Lebanon has experienced the epidemiological transition such that the leading causes of death

have shifted from primarily infectious to noncommunicable diseases. A recent study attempted to quantify the magnitude of communicable and noncommunicable disease mortality among middle-aged and older populations in urban settings. In both men and women, noncommunicable, mainly circulatory diseases (60%) and cancer (15%) were the leading cause of death. Furthermore, data from this same study showed relatively high levels of chronic disease morbidity (hypertension, 25%; diabetes, 13%) and a high prevalence of the major risk factors such as smoking (44% among men and 24% among women).<sup>12</sup>

Specific to the DAF community, research conducted in 1997 by members of the present research team, and covering 658 persons (186 men, 472 women) aged 30 years and older, indicated a high prevalence of CVD risk factors. The prevalence of smoking, hypertension, obesity, diabetes, hypercholesterolemia, and low high-density lipoprotein cholesterol (HDL-C) concentrations were 38.4%, 12.3%, 61.6%, 18.1%, 30.4%, and 43.5%, respectively, among men compared with 27%, 12.1%, 81.6%, 16.7%, 33.9%, and 17.6%, respectively, among women.<sup>13</sup> Given these data, the researchers recommended the initiation of a CVD prevention intervention. On the basis of the results of community-based initiatives in developed countries, the researchers specifically recommended the initiation of a community-based approach for prevention in the DAF community.

The initiative is thus modeled after the large-scale CVD community-based prevention trials in Europe and the United States. Community-based prevention interventions in developed countries have succeeded in bringing about health behavior change by mobilizing the community and engaging them in all aspects of the intervention. Although such programs are common in Europe and the United States, they have not been initiated to date in the Middle East.<sup>14-18</sup>

The initiative tests the feasibility of a community-based prevention program in reducing the prevalence of CVD risk factors such as smoking, sedentary lifestyles, hypertension, and obesity, and ultimately of CVD. Although the initiative is based on experiences of past interventions, it is not intended to replicate such initiatives. Success of any public health intervention is contingent on its adaptability to local context and setting.

### **CHARACTERISTICS OF DAF AND THE DEVELOPMENT OF A COALITION**

DAF is a lower to middle socioeconomic status urban community situated in the center of Beirut district with a population of approximately 7,000 people. Some organizational resources within the DAF community include one health club, one community public garden, one dentistry center and one physiotherapy center, four religious centers, four health centers, five pharmacies, five schools (elementary and secondary), and 81 private clinics.

Contact with some community leaders had been established as a result of the previous study.<sup>13</sup> After sharing results of that study with these leaders, they supported the development of an intervention program specifically for the prevention of CVD and its related risk factors. Although specific organizations in the community had a history of action in the form of noncoordinated emergency relief as a result of the civil war in Lebanon, no coordinated community action has taken place for prevention.

“Together for heart health”—the slogan given to the initiative—was initiated in February 1999 with the establishment of a coalition consisting of key leaders holding formal and informal positions within the community. Leaders holding formal positions included

health center directors, school principals, mayors, religious leaders, and so on. Key leaders holding informal positions were identified by walking through the neighborhood and inquiring into who “people talk to when they have problems” and a subsequent snowball technique. The coalition continued to meet every other week until December 2001. Additional details of coalition building are described elsewhere.<sup>19</sup>

The initiative is based on the principles of community development<sup>20</sup> with the exception of the choice of the priority health problem (CVD), which was selected by the academic research team due to availability of funding resources for this health condition. Subsequently, the university’s role was one of facilitating a process in which the community coalition guided the collection of data and the development, implementation, and evaluation of interventions. Specifically, Bracht and Kinsbury’s model of community organizing<sup>21</sup> was used to frame the initiative’s phases.

The initiative went through three distinctive phases outlined as follows:

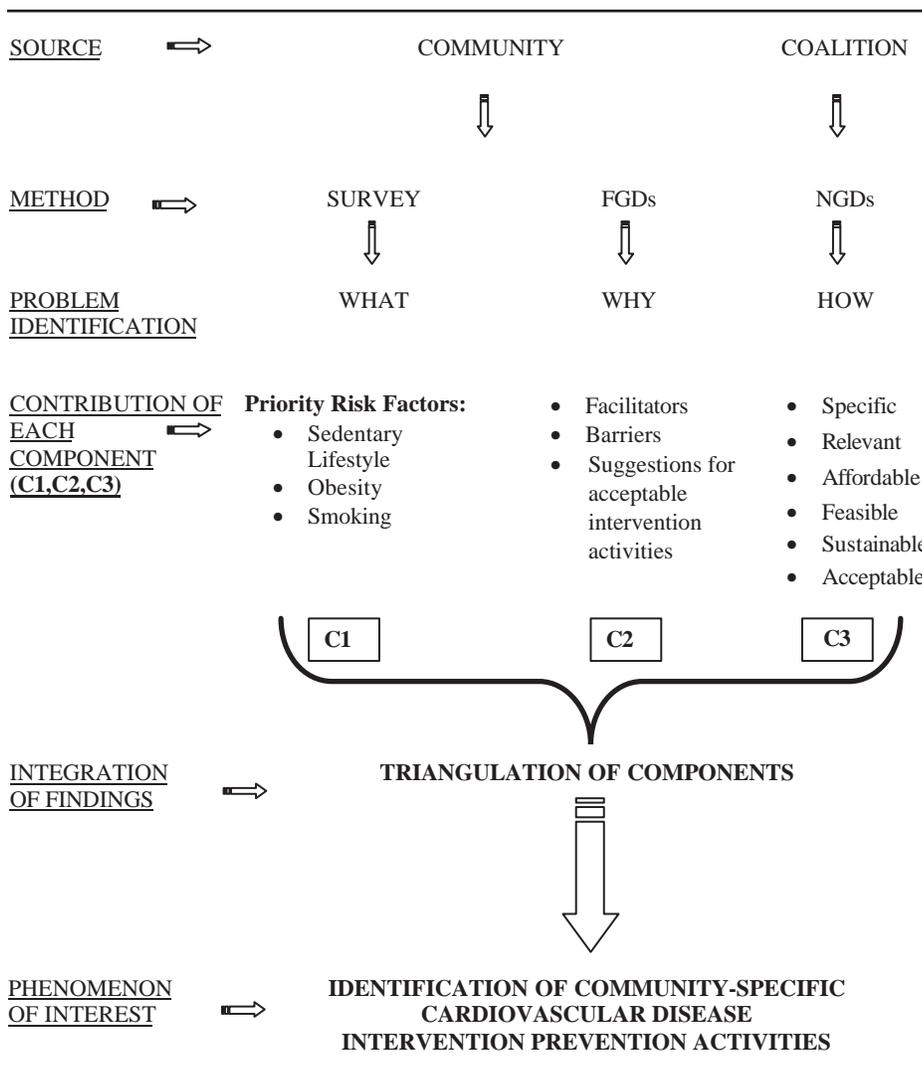
*Phase 1* involved community mobilization and formation of a committed coalition group. Following that, a thorough community analysis was conducted in coordination with the coalition. Time frame: September 1998 until May 2000.

*Phase 2* was the intervention implementation stage where the coalition used its local knowledge and the community analysis data for priority setting and subsequent intervention development. Triangulation took place in this phase. Following prioritization of intervention topics, the coalition formed task forces for each topic and started planning for the actual intervention. Interventions included educational and skill-building sessions organized through existing social and organizational structures such as community health centers, public gardens, religious institutions and schools, and health clubs. Time frame: April 2000 and continuing.

*Phase 3* was the maintenance and evaluation phase of the initiative. Intervention activities were evaluated in terms of their feasibility and applicability in the DAF community. Although sustainability had been considered from the beginning of the initiative, it took on increased importance in this phase. Time frame: April 2000 until March 2002.

### THE THREE TRIANGULATION COMPONENTS

As mentioned previously, results of three components, a quantitative survey, qualitative focus groups, and qualitative natural group discussions were triangulated. The questions included in the survey and subsequently in the focus group guide were based on a review of literature of similar initiatives, as well conscious attention to constructs of health behavior and health education theory. These constructs focused mainly on the intrapersonal and interpersonal levels of the ecological model of health promotion (EMHP).<sup>22</sup> However, no one specific theory was used exclusively throughout the initiative. As an example, the survey inquired about self-efficacy, social support, and outcome efficacy. In addition, the focus group inquired about barriers and facilitators to change. As for the natural group, discussions revolved around identification of specific factors that made one or more of the interventions proposed more likely to be adopted, implemented, and sustained. In this sense, many of the constructs identified focused on attributes of innovations that made them more likely to be adopted.<sup>23</sup> Diffusion of innovations is often listed within the community level of the EMHP.



**Figure 1.** The triangulation strategy.

Data from each of the three components were gathered and analyzed separately prior to the integration of findings. Quantitative and qualitative methods inherently answer different questions. Each component was expected to provide answers to general questions posed (Figure 1). The methods and results of each component will be described below, followed by the integration of the findings for intervention development.

**First Component: Quantitative Household Survey**

*Method.* The household survey instrument developed for the community included two main sections: assessment of (1) risk factor levels using the Monitoring of Trends and Determinants in Cardiovascular Diseases (MONICA) study questionnaire<sup>24</sup> and (2) knowledge, attitude, and behavior towards CVD risk factors, namely, smoking, lack of physical activity, and inappropriate nutritional habits. Trained interviewers conducted a

Table 1. The Dar Al Fatwa Study Population: Demographic Characteristics

Study Population (25 to 64 years)	N	%
Target population	3,434	
Residents interviewed	2,846	83
Physiological measurements and blood tests	1,208	42
Demographic Characteristics		
Sex		
Men	1,240	44
Women	1,606	56
Married	1,942	68
Education <sup>a</sup>		
Men	616	50
Women	661	41
Employed		
Men	1,117	90
Women	470	29
Residency (>10 years)	1,935	68

a. Secondary, higher, and technical.

total of 2,846 face-to-face interviews with community members aged 25 to 64 years in their homes. This constituted a response rate of 83%.

All individuals who completed the questionnaire were offered free physical and physiological measurements at one of four neighboring health centers. These measurements included height, weight, and hip circumference, and blood samples were taken for fasting blood sugar, LDL, HDL, cholesterol, and triglyceride levels analysis. Forty-two percent of those who completed the face-to-face interviews completed the free physical and physiological measurements.

The process of data collection was rigorous and included quality checks at various points in the process (details of the survey administration are described elsewhere<sup>19</sup>). A private firm was contracted to enter the data into the Statistical Package for the Social Sciences (SPSS). Data were cleaned and analyzed in SPSS<sup>25</sup> by the initiative team.

*Results of the Quantitative Household Survey of Community.* Table 1 highlights the demographic characteristics of the survey respondents. Table 2 summarizes the prevalence of smoking and lack of physical activity from the survey and of obesity, blood sugar, LDL, HDL, cholesterol, and triglyceride levels from the physical and physiological measurements.

In addition, results from the survey suggest that knowledge regarding the effects of smoking was relatively high: 84% of respondents stated that smoking led to heart disease, 83% believed smoking can cause cancer, 82% said parental smoking led to respiratory diseases in children, and 67% said parental smoking influenced children to smoke later on. Among current smokers, 54% stated that they were not confident in their ability to quit smoking, 30% stated that they were confident, and 17% stated that they were very confident.

With respect to physical exercise, the survey additionally indicated that 86% of respondents believed that regular exercise prevents heart disease. Fourteen percent of all

Table 2. Prevalence of CVD Risk Factors Among Dar Al Fatwa Population (in percentages)

Risk Factor	Males	Females
From survey		
Smoking	42	31
Heavy smokers <sup>a</sup>	42	20
Lack of physical activity <sup>b</sup>	63	71
From physiological measurements		
Obesity (BMI $\geq$ 30)	36	39
High blood pressure		
Systolic $\geq$ 165 and/or diastolic $\geq$ 95	14	7
Systolic $\geq$ 90 and/or diastolic $\geq$ 90	31	18
Blood sugar level ( $\geq$ 126)	15	10
Dyslipidemia		
LDL ( $\geq$ 150)	18	23
HDL ( $\leq$ 35)	22	6
Cholesterol ( $\geq$ 240)	18	19
Triglyceride ( $\geq$ 160)	49	29

NOTE: CVD = cardiovascular disease;. BMI = Body Mass Index.

a. Among smokers, those who smoked more than 20 cigarettes per day.

b. Do not engage in any form of physical activity, even walking.

respondents stated that they were not confident in their ability to exercise regularly, 46% stated that they were confident, and 40% stated that they were very confident. Seventy-nine percent of respondents said that there were no free places for exercising in the community, 3% said that there were free places, and 17% said that they didn't know if there were any.

Knowledge related to the consequences of obesity was also relatively high, 83% of respondents believed that obesity led to heart disease, 82% believed that high levels of fat in the diet increased the probability of heart disease, and 78% believed that obesity increased the probability of developing hypertension. Eighty-nine percent of survey respondents believed that people should follow a proper diet to stay healthy. Several different methods were used to reduce weight. These methods included reducing the amount of usual food intake (87%), exercising (68%), skipping meals (57%), following a diet (40%), using laxatives (16%), using pills (6%), and self-inflicted vomiting (4%). One-quarter of the population ate their lunch while watching TV everyday. Twenty-five percent of obese respondents stated that they didn't feel the need to reduce their weight.

### **Second Component: Focus Group Discussions With Community Members**

*Method.* In the household survey, a list of the phone numbers of individuals willing to participate in focus group discussions (FGDs) was compiled and used to recruit both male and female participants by phone. It was more culturally appropriate that a male contact male participants and a female, female participants. A member of the research team effectively conducted recruitment of female participants by telephone. However, recruitment of men by phone proved difficult due to long working hours; thus, recruitment was additionally conducted through personal contact. The coordinator of a local

nongovernmental (NGO) health center was instrumental in recruiting male participants for the FGDs using invitation cards provided by the research team.

A total of eight focus group sessions were conducted in the community of DAF in the months of October and November 1999. Sessions were conducted with men and women separately in two different local NGO health centers, for two different age categories, 25 to 44 years and 45 to 64 years. All sessions were led by a female moderator and lasted around 45 to 60 minutes. Participation in the focus group sessions ranged from 4 to 9 persons. Participants were briefed about the purpose of the focus group, informed that they could choose to leave at any time during the discussions, and that confidentiality was assured.

A semistructured interview protocol guided the discussion and ensured consistency between various sessions. The focus group protocol focused on perceptions regarding the necessity of a prevention program in the community, possible ways to prevent CVD risk factor development, perceived facilitators and barriers to a healthy lifestyle, as well as acceptability of various intervention activities. State-of-the-art recording equipment to drown out background noise was unavailable. Therefore, after audiotaping one session in which discussion was undecipherable on replay, audiotaping was discontinued. As a result, an additional person attended the sessions and took down notes of all the conversation in details.

One person conducted the analysis manually. The focus groups were conducted in Arabic. All notes were written in Arabic. The researchers believed that much context and meaning would be lost in a translation to English. Computer software for qualitative analysis is not available for Arabic transcripts and notes. Notes of all sessions were content analyzed, and topics were categorized and classified by theme. All answers to the same question were cultivated and read together. Themes emerged from the text to the different questions of the guide.

### Results of Focus Group Discussions

Results reported below pertain to responses to the question of (1) facilitators and barriers to healthy lifestyles and (2) possible intervention methods.

*Barriers and Facilitators to a Healthy Lifestyle.* Table 3 summarizes the responses of focus group participants related to barriers and facilitators to healthy lifestyles. Perceived barriers to smoking cessation were lack of knowledge, lack of will power, and *za'al*. *Za'al* is an Arabic term that summarizes *nervousness*, *stress*, and *sadness*. Barriers to physical activity included lack of time, accessibility, and laziness. In addition, women specifically mentioned lack of companionship as a main barrier to physical activity, whereas men specifically mentioned physical exhaustion, and *za'al*. The bad economic situation was a major perceived barrier to exercising, nonsmoking, and healthy eating habits. In addition, focus group respondents thought that a less stressful life and less *za'al* were main facilitators to a healthier lifestyle in general.

*Potential Feasible Intervention Activities.* The importance of media coverage, community activities, and establishment of community resources were the three main intervention areas that emerged from FGDs. In terms of media, almost all participants stressed that if prevention efforts were displayed on TV through short programs at peak hours, a lot of people would see them. Radio was also cited as an appropriate media channel for

Table 3. Emerging Themes Regarding Barriers and Facilitators to a Healthy Lifestyle Following Discussion Guide Topics

	Barriers	Facilitators
Nonhealthy diet	Financial Love of food Stress Uncontrollable appetites Cultural: love of food	Knowledge about healthy eating/cooking Financial Stress-free lives
Lack of physical activity	No place Affordability Accessibility Stress Lack of time	Affordable place Accessible place Companionship
Smoking cessation	Nicotine addiction Financial burden Stress Lack of will Other smokers in house	Knowledge about dangers Public ban of smoking Financial stability Willpower

housewives and those who listen to the radio in the car. Television and radio were thought appropriate because a person could be exposed to a brief message while going on with his or her routine life or between watching his or her favorite programs.

Flyers were thought essential if distributed door-to-door. Moreover, some participants thought that presenting disease prevention messages in the form of caricature in newspapers, magazines, or media campaigns on TV would be effective in addressing the illiterate population.

In terms of community activities, participants voiced the perceived time constraint imposed by lectures. Lectures were acceptable if they were scheduled in monthly seminars and varied in topics. Continuity was thought to be important in encouraging attendance. Lectures in schools targeted at parents were also thought to be acceptable. Moreover, women stressed their interest in learning new skills, such as exercise tips or methods of healthy cooking that they can apply at home on their own time and at their own convenience.

With respect to establishing new community resources, most participants thought that an affordable health club in their neighborhood would increase their exercise time. Moreover, some participants thought it necessary to establish a prevention center that organizes and invites families to activities and seminars. The center could act as a gathering place for walking groups and serve as a reference point where intervention activities are planned and implemented.

*Acceptability of Interventions From Past Community-Based Prevention Programs.* Because preventive activities have rarely been initiated in Lebanon, activities from previous community-based prevention programs in Europe and the United States were suggested for feedback. Some of the proposed ideas were already mentioned during the course of the discussion, such as the use of media campaigns on TV. The activities identi-

fied by focus group participants as applicable in their community were annual health fair and racing events, a trip for entertainment that includes prevention activities, a section in the newspaper that reports on activities of the initiative, healthy cooking sessions for women, flyer distribution, and awareness campaigns on caloric content of food.

### **Third Component: Natural Group Discussions With Coalition Members**

*Method.* Attendance at a coalition meeting varied between 7 and 20 participants, with around 10 participants consistently attending. In coalition meetings, community members, health center representatives, and the research team discussed initiative matters and cooperated in planning and implementing initiative activities. Whereas the survey provided the data and the focus groups provided in-depth understanding of the facilitators and barriers to adopting a healthy lifestyle, the coalition discussions allowed for an assessment of the advantages and disadvantages of every possible strategy at various decision-making junctures within the initiative. This was critical in ensuring that all aspects of the initiative—assessment, planning, intervention, and evaluation—were relevant, acceptable, and applicable to the DAF community. Newsletters distributed after all coalition meetings summarized the main topics discussed and decisions taken at each meeting. These newsletters were reviewed to validate the specific results of this component.

*Results.* Group discussions with coalition members were crucial for increasing response rate to the survey, which is a critical determinant of the strength of conclusions drawn from the results. Coalition members suggested that field-workers wear identification badges signed by the city leader and the university sponsoring the initiative. They also suggested that flyers explaining the initiative and the impending survey be placed on the doorsteps of all houses in the community.

With respect to intervention selection, coalition members identified the same barriers and facilitators that the focus group members cited. However, they stressed the importance of developing interventions that are (1) inexpensive especially in light of the economic situation of the community and (2) replicable in order to ensure sustainability of the prevention program.

Coalition members were also able to synthesize data from the other components in the development of interventions. For example, they noted that many of the barriers and facilitators mentioned in relation to smoking were a result of the lack of resources to help persons quit. An effective quit resource could target many of the barriers and facilitators.

The particular message that a selected intervention should focus on was also clarified in discussion with coalition members. Coalition members questioned the triggers that would result in a person quitting smoking. They believed that residents in their community may not quit smoking for their own sake but may do so for the sake of their children, if they perceived their children's health to be in danger.

Discussion with coalition members also helped in selection of the target population for specific interventions. For example, they stressed the importance of targeting women first for nutrition education. Women still hold traditional roles in this community. They are primarily responsible for the purchase of food and for cooking. If they are convinced to cook in a healthier way, they not only improve their health but also that of the whole family.

## INTEGRATION OF FINDINGS IN THE SELECTION OF INTERVENTIONS

As a result of the triangulation of the three components, a variety of intervention activities were developed and implemented within the community. In this section, the unique contribution of the various components in the selection of specific intervention activities will be highlighted through cases that compare and contrast respective results.

Whereas the data collection phase focused on the intrapersonal, interpersonal, and community levels of the EMHP,<sup>22</sup> intervention selection aimed at covering all levels.

The survey clearly indicated that the three risk factors of highest prevalence were smoking, inappropriate nutrition, and lack of exercise. As a result, interventions were developed in these three areas.

### Antismoking Interventions

*Case 1.* Given the survey results that indicated relatively high levels of knowledge with respect to the consequences of smoking, the research team did not think there was a need to focus many of its resources on raising awareness of such consequences. However, the focus group discussion and the natural group discussions (NGDs) both suggested provision of knowledge as a necessary intervention. The focus group participants may have been focusing on a younger age-group when they mentioned lack of knowledge as a determinant of smoking. Also, it may be possible that although FGD participants knew about ill-effects of smoking themselves, they assumed that others lacked that knowledge.

A compromise that supported the opinions of community residents and yet did not contradict the results of the survey was to implement a drawing contest for schoolchildren. This could act as an indicator of youth levels of knowledge and educate them and their parents about the dangers of smoking as well. The winning drawings were displayed in an exhibition set up in one of the health centers of the area. In response to NGD suggestions, the exhibition also included five real cancerous gross specimens from the university's pathology lab to "scare people." Encouragement to quit smoking served as the effective solution in response to the "fear" message.

*Case 2.* A reliance on survey results would have probably led to the development of an intervention to encourage smoking cessation, but such an intervention might have focused on the benefits of quitting *on the individual*. As a result of the discussions within the coalition (NGDs), it became evident that the trigger for smoking cessation in this particular community could focus on the benefits of quitting *on children*. The responsibility that parents have for their children's health is of high priority. Consequently, an antismoking poster was developed that focused on this issue. The poster portrayed the head of a child filled with extinguished cigarette butts and stated, "Is this the ideal way to raise your children?"

*Case 3.* Whereas a reliance solely on focus group results would have resulted in a smoking cessation intervention that stressed the "lack of willpower," the NGDs pointed to the more general lack of resources for helping persons to quit smoking. As a result, an expert on smoking cessation conducted a trainer of trainees on the eight-session "Freedom from Smoking" program of the American Lung Association.

### **Physical Activity Promotion Interventions**

*Case 4.* A focus solely on the survey results would have resulted in interventions aimed only at providing free places to exercise in the community. This was, in fact, arranged during April, in which local health club owners (two more had opened since the community assessment that had revealed only one) offered a 1-month free subscription and subsequent discounts for community members.

*Case 5.* Although FGDs and NGDs did mention affordability, they also introduced the notion of accessibility. This is partially related to the provision of different hours of exercise for women and men. One way to overcome this particular issue of access is to select a form of exercise that does not require a “gym” and therefore can be conducted at various times convenient to various subgroups. One such activity suggested by the NGDs was walking. The campaign to encourage walking was launched with a “walking day” where participants gathered at the public garden and walked together to the seaside. Walking also targeted the barriers of affordability as it did not require purchase of expensive equipment and health club memberships.

*Case 6.* An additional facilitator specifically mentioned in the FGDs was the need for companionship. Thus, maintaining the walking theme suggested by the NGD to target affordability and accessibility, and adding the issue of companionship, neighborhood walking groups were formed and convened early morning and late afternoon at the neighborhood public garden.

*Case 7.* Finally, in an attempt to target all three factors of affordability, accessibility, and companionship, a coalition member donated a basement to be renovated into a local community health club and exercise area. The local community health club is intended to be run by community members and will provide an affordable and accessible place for community members to meet (companionship) and to engage in physical activity.

### **Nutrition Interventions**

*Case 8.* The survey indicated that knowledge regarding the consequences of obesity was high and that respondents believed that a healthy diet was important. The survey itself provided no clues for intervention focus. The survey did not assess the levels of knowledge regarding what constitutes a healthy diet. Focus group results highlighted the importance of awareness education classes but did not provide a target for such awareness raising. NGDs stressed the role of women in meal preparation and thus in the nutritional health of the family. The physical measurements supported a focus on women as they indicated slightly higher prevalence of obesity among women than men.

As a result, nine nutritional intervention sessions were developed and targeted to women. The sessions were intended to (1) enhance the knowledge of participants concerning obesity, safe weight loss methods, and healthy eating patterns and (2) teach skills in healthy shopping and cooking.

*Case 9.* NGDs and FGDs also pointed to the need for skill building. Healthy cooking classes were organized. Only women who had attended the awareness sessions above were invited to participate in skill-building sessions.

### General Interventions

Several of the activities organized were multifactorial in essence.

*Case 10.* Upon recommendation from the NGD and FGD participants, the coalition identified a series of lectures including one each on the benefits of exercising on health, the ill-effects of smoking and quitting tips, problems of obesity, and diabetes. All lectures were given by physicians once per month on the same date and time and rotated among the various local health centers. Even though survey results indicated high levels of knowledge in the community, those lectures were thought necessary by community and coalition members for reinforcing knowledge and awareness levels.

*Case 11.* Also, based on recommendations of FGD and the natural group participants, a community heart health fair in the neighborhood garden was planned. Its purpose was to increase publicity, community participation, and heart health awareness through the delivery of interactive educational activities.

### DISCUSSION

The triangulation strategy used in this research is summarized in Figure 1. Two sources of data—community and coalition members, provided information through one of three methods—a quantitative survey, qualitative FGDs, and qualitative NGDs. The combination of sources and methods resulted in three components that were triangulated. Overall, each component contributed uniquely to the understanding of the phenomenon of interest, namely, the identification of CVD intervention activities that are relevant and acceptable to the DAF community.

The survey indicated which risk factors were prevalent in DAF and thus answered the question related to *what* the focus of interventions ought to be. However, “what” alone does not provide enough information for the development of effective interventions. FGDs added the understanding of community-specific factors that facilitate or hinder behavior and in that provided information about *why* specific risk factors were reinforced and sustained. Although this provides important information for intervention development, it does not explain the finite specificity of community on which effective interventions are hinged. The NGDs supplied this specificity and described *how* effective and sustainable interventions could be developed to benefit the DAF community. The unique contribution of each of the components is evident in the integration of findings. Cases 5 and 8 will be highlighted here as examples. In Case 5, lack of exercise emerged as a high priority from the survey, accessibility was listed as a barrier in the FGDs, and walking was suggested as a solution in the NGDs. Similarly, in Case 8, obesity emerged as a priority from the survey and associated physiological measures, awareness of what constitutes healthy nutrition was mentioned as a facilitator in the FGDs, and the importance of women’s awareness was highlighted in the NGDs.

Triangulation of methods and sources can also result in validation of findings between methods and contradictory findings between methods. As for validation between methods, Case 4 highlights a situation in which all three components indicated the lack of affordable places as a barrier to exercise. In addition, Case 9 illustrates the validation of FGD and NGD discussion data with respect to the need for skill building in nutrition.

On the other hand, Case 1 is an example of contradictory findings where the survey indicated high levels of knowledge related to consequences of smoking, and the FGDs indicated increased knowledge as a necessary facilitator. This contradiction could be related to a difference in target population. The survey summarized knowledge of 25- to 64-year-old residents of the community, whereas FGD participants may have focused on the importance of increasing the knowledge of young persons. In addition, the most common lay, and often professional, solution to any health problem is increasing knowledge of consequences, and FGD participants may have stated this solution without much in-depth thought into its real need.

In summary, triangulation of data sources and methods allowed for a better understanding of the unique aspects and characteristics of the community and thus for the development and implementation of more feasible community-specific intervention activities. Each of the data collection methods and sources contributed to a better understanding of the community by supplementing each other as well as confirming findings. By using results of the household survey, the FGDs, and NGDs, the culturally and socially specific determinants of behavior change in the DAF community were identified, and thus intervention activities were tailored to fit local needs and resources.

### **Limitations**

Several limitations of this research must be noted. The validity of the results obtained through triangulation is inherently dependent on the validity and reliability of each of the components included in the approach.

Response rate to the household survey was more than 80%. This is an acceptable response rate to household surveys. However, of those who responded to the survey, only 42% took advantage of the free physical and physiological measurements. In this research, physical measurements were used only to define obesity as a priority area. The triangulation strategy would be flawed to the extent that obesity is, in fact, not a priority area for intervention. The prevalence of obesity calculated from objective measures of height and weight was more than 30%, whereas the prevalence of obesity (Body Mass Index [BMI] > 30) calculated from the survey (self-reported height and weight) was 20%. An analysis completed on individuals who completed the survey *and* presented for objective measurements (data not shown) indicated that the prevalence of obesity calculated from their self-reported height and weight was 23% (quite similar to that of the survey sample as a whole). This analysis also indicated a misclassification of 37% in the direction of lower self-reported BMI than measured BMI. These results support the fact that obesity is, in fact, a priority area. Increasing the subsample presenting for physical and physiological measurements ought to be the objective of similar future efforts. A great part of the low response rate to these objective measurements was their timing. Objective measurements were offered from 8:00 a.m.-12:00 noon every day of the week. Most men in DAF are working long hours, and some have more than one job. This left only the weekend and probably only Sunday for them to participate in the objective measurements. Future efforts should provide more flexibility in timing of objective measurement.

The biggest limitation of the focus group discussions with community members was the lack of taped transcripts. The reliance on notes of the recorder and the facilitator may have resulted in a loss of the richness of focus group data. The focus group data were to provide the explanation of facilitators and barriers to engaging in health promoting behavior. This explanation was to add to other sources of data for the development of interventions. The methodological approach of triangulation for intervention develop-

ment lessens the impact of this limitation. The loss of data richness would be a greater problem had the focus group data been the only source of data used. The department of health behavior and education is currently looking into the purchase of effective recording equipment for focus group discussions.

The use of qualitative software may have facilitated the analysis of focus group data. However, Arabic is a language that is very rich in symbolism, and the translation of the transcripts into English was thought to potentially result in a loss of richness. Thus, the data were analyzed manually. We have recently learned of the possibility of incorporating Arabic transcripts into selected qualitative software. In the future, this form of data analysis could be used.

The consistent lack of participation of a large number of community members in coalition meetings was a barrier throughout the initiative. Approximately 10 persons on average attended consistently. The triangulation strategy would be flawed to the extent that the views of these persons regarding what constitutes an appropriate intervention in DAF were different from those of other community residents. The coalition members who attended meetings consistently included representatives of the health centers in the area as well as local community members. All had lived in the area for more than 10 years. Observational data indicated that they were well respected by community members. In addition, the success of initiative components based on the suggestions of coalition members, as outlined in the Results section for this component, belies the possibility that their insights related to appropriate interventions were vastly different from those of other individuals in the community. Lack of participation of large segments of the target population in coalitions has been a problem that has plagued many community-based interventions. Suggestions for increased participation of community members in coalitions include assigning the task of increasing membership to coalition members themselves or increasing visibility of the coalition and recognition of participation.

### **Implications for Practitioners**

Participation of the concerned population in the development of community-based health promotion activities is critical to the design of effective, appropriate, and targeted interventions. The particular form in which participation can occur varies, including consenting and responding to quantitative survey items, providing more in-depth insight through partaking in focus group discussions, or joining a coalition that guides the initiative. This article demonstrates the combination of information from more than one method and data source.

This combination has advantages and disadvantages. Among the disadvantages is the resource intensity, including time, human resources, and monetary resources. The survey took 3 months to complete and required 10 field-workers and 3 field supervisors, not including the pretest and pilot test. The focus groups were conducted and analyzed by the research team. This took an additional 3 months, which included locating and inviting the participants, as well as conducting and analyzing the data. The NGDs were also conducted and analyzed by the same team. The process of coalition building lasted 7 months, and the discussions included in the triangulation and influencing intervention development took place during the course of 14 months.

The advantages are a result of the unique contributions of each data source and each data collection method in understanding the phenomenon. With respect to unique contributions of methods, quantitative data often provide breadth of exposure and an understanding of 'what' are priority health issues in a particular community. In our case, more

than 2,500 individuals aged 25 to 64 years were surveyed in their homes. The priority health issues were identified as smoking, lack of exercise, and inappropriate nutrition leading to obesity. Qualitative methods provide depth and an understanding of *why* issues are such and *how* to begin analyzing and solving them with communities. In our case, FGDs and NGDs were conducted with a limited number of participants but provided insight into barriers and facilitators to change generally, as well as suggestions for specific interventions. With respect to data sources, various community data sources provide different information as a result of their level of commitment to a particular initiative. The survey respondents allowed us to enter their homes. Focus group participants were selected from among those survey respondents who agreed at survey time to participate in a more in-depth discussion. Coalition members had committed to long-term participation at the time of joining the coalition.

The advantages far outweigh the disadvantages. The intervention activities developed as a result of the triangulation of data methods and sources are community specific, relevant, and affordable. As a result, they are more effective and sustainable. This combination of intervention activities could not have been developed in the absence of any one piece of information. Effective and sustainable interventions are, in fact, cost-effective. Thus, the cost-intense disadvantage is ultimately diminished in an assessment of efficiency.

Practitioners are encouraged to obtain information from a variety of methods and sources in the development of community-specific interventions.

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